CLAIMS

1. Polytrimethylene terephthalate hollow composite staple fibers each comprising two parts which are constituted from polytrimethylene terephthalate resin components different in intrinsic viscosity from each other, arranged in a side-by-side or a core-in-sheath arrangement, and extending along the longitudinal axis of each composite staple fiber, and having a hollow part formed within each composite staple fiber and extending along the longitudinal axis of each composite staple fiber,

wherein,

(1) one of the two polytrimethylene terephthalate resin components has an intrinsic viscosity in the range of from 0.50 to 1.4 dl/g, and the other one of the two polytrimethylene terephthalate resin components has an intrinsic viscosity in the range of from 0.40 to 1.30 dl/g, and 0.1 to 0.5 dl/g below that of the polytrimethylene terephthalate resin having the intrinsic viscosity of 0.50 to 1.40 dl/g, the intrinsic viscosities being determined in o-chlorophenol at a temperature of 35°C;

(2) the cross-section of the hollow part has a cross-sectional area corresponding to 2 to 15% of the total cross-sectional area of the composite fiber; and

(3) the composite staple fibers exhibit an average web area thermal shrinkage of 30 to 70% determined by such a measurement that the composite staple fibers having a fiber length of 51 mm are formed into a web having a basis mass of 30 g/m^2 by a roller carding machine, a plurality of specimens having dimensions of 20 cm × 20 cm are prepared from the web, the specimens are heat-treated in a hot air circulation dryer at a temperature of 120°C for 10 minutes, to allow the specimens to freely shrink, the web area thermal shrinkages of the specimens are determined in accordance with the equation (1):

Web area thermal shrinkage (%) =

$$[(A - B)/A] \times 100 \qquad (1)$$

wherein A represents of an area of each specimen before the heat-treatment and B represents an area of the specimen after the heat-treatment, and an average of the resultant web area thermal shrinkages of the specimens is calculated.

2. The polytrimethylene terephthalate hollow composite staple fibers as claimed in claim 1, wherein the hollow part is located in one of the high and low intrinsic viscosity polytrimethylene terephthalate resin parts of each composite staple fiber

3. A process for producing polytrimethylene terephthalate hollow composite staple fibers as claimed in claim 1 or 2, comprising the steps of:

melt-spinning two polytrimethylene terephthalate resins, different in intrinsic viscosity from each other, through a hollow side-by-side or core-in-sheath type composite filament-forming spinneret, to provide undrawn hollow composite filaments;

drawing, in two stages, the undrawn hollow composite filaments at a total draw ratio corresponding to 60 to 80% of the ultimate elongation of the undrawn hollow composite filament, in such a manner that the drawing temperature is 45 to 60°C at the first stage and then 85 to 120°C at the second stage and the drawing ratio for the second stage is controlled to 0.90 to 1.0 so as to adjust the total draw ratio to as mentioned above;

machine-crimping the drawn hollow composite filaments at a temperature of 50 to 80°C;

heat-treating the crimped hollow composite filaments at a temperature of 80°C or less while allowing the crimped hollow composite filament to relax; and

cutting the heat-treated hollow composite filaments to provide hollow composite staple fibers.